Ex#14

4-7-26 IWWC Public Hearing

1. (Slide) Here to present Town's proposal for further drainage remediation in the Pine Swamp Brook watershed.

- This effort began with some intervention last summer to relieve flooding that I will describe further later.
- This proposal is endorsed by the property owners of 25 Harvard Terrace & 39 Military Hwy over which access is required & on which some of the work will be done.
- The owner of 25 Harvard Terrace (Avalonia Land Conservancy) has been closely involved in monitoring this effort from the beginning & officials of Avalonia have been involved in multiple site walks to examine the situation.

2. (Slide)This is an excerpt of the present USGS map showing the area in larger context, starting with Pine Swamp with Pine Swamp Brook working its way from there through a lot of road infrastructure, thru Pine Swamp Brook Pond (aka Cranberry Bog Pond or Cranberry Pond), then Smith Pond to Mill Cove then the Thames River.
3. (Slide) This is an excerpt of the Town's GIS map homing in more closely on the watershed area in closest proximity to the work, (annotate) as outlined here.
4. (Slide) And even further expanded, this shows the upstream area where the effects of flooding have been most detrimental, including the culvert crossings shown on Christy Hill Rd and Rt 12.
5. (Slide) And here is a closeup of the Pine Swamp Brook Pond in context of the Harvard Terrace neighborhood, annotated with the State Dam number. The impoundment of water in the pond is by an officially registered dam #7212.
6. (Slide) I have a number of slides that put this watershed in a progressively advancing historical context. Here we see that in 1893, there was limited infrastructure and the brook flowed relatively freely in this vicinity until impounded at what is now known as Smit Pond. There was no pond above it.

7. (Slide) By 1927 an unimproved road had been constructed that did result in the pond now known officially as Pine Swamp Brook Pond. Don't know the reason, e.g., did it have something to do with a former Cranberry Bog operation? But even at this pt, the present-day Rt 12 had not been constructed, and we see the brook flowing relatively freely & entering as depicted at NE corner of new pond.

8. (Slide) I know hard to see, but here is one of the 1st maps filed in Town Clerk's office (#29A). It is a plot plan from June of 1948 showing "Cranberry Bog" w/ an an original concrete dam structure w/ the brook entering the NE corner.

9. (Slide) Here is an excerpt of the 1971 Town Assessor's Map #91 that shows a topographical representation of the pond wetlands complex. Here we clearly see the introduction of the berm that is present, though we don't know exactly when or for what purpose it was placed there. There were no wetlands regulations that would have governed its placement at the time.

10. (Enlarge) And if I enlarge the two elevations given for the pond and wetlands you see that they are identical (i.e., 24.0). This means that these two areas are historically equalized—the berm is not an intermediate dam, nor was it intended to be. The brook entering the NE corner would have remained free flowing between the wetlands and the pond.

11. (Slide) But recently, over the last several years, beaver activity compromised this free flow. Generally speaking, the beaver population in the area has increased & we have been dealing w/ a number of road flooding issues throughout the Town. This picture is among a number that a local resident fm Harvard Ter sent us. And you see the location of this dam annotated on the former plans at the location of the inlet of the brook to the pond.

12. (Slide) At the same time, toward the middle of the berm, the beavers further built up a low spot there. Between the 2 photos, you will noted an upstream elevation increase of at least 18". This caused water to back up all the way thru the Rt12 culvert crossing & across Christy Hill Rd impacting properties there, as noted earlier.

13. (Slide) The Town had the beavers trapped out of the area above the berm, but there was no way to readily access the beaver dam to remove it. Instead, as an intermediate measure, I directed the Town crew to provide immediate relief by digging 2 narrow trenches thru the berm. The primary one was at this location, & secondary one about 25' to the west. This activity was subsequently approved by the Commission at their 12/2/25 meeting.

14. But this still left us w/ work to do there & also at the outlet of the pond. (Slide) The outlet control at the dam is accomplished thru 2 different 30" culverts. Again, I found no history of how this arrangement came to be, nor why the primary control structure was obstructed at some point by a berm that appreciably isolates it from the pond. But this arrangement has left the open culvert as primary control pt, i.e., the level of the pond is entirely governed by this open pipe & forms basis for the pond level experienced in the dry season.

15. As to the outlet end (slide) Save the Sound sponsored a regional study comprising a number of road-stream crossing inspections, which happened to include the dam at Harvard Terrace. Specifically w/ respect to the concrete drop inlet, you see here that it was assessed as poor w/ a severe constriction rating.

16. (Slide) In late 2024, the Town hired WMC Engineers to do a required inspection of this dam, which yielded an overall fair rating, for many of same reasons. The Town had done a temporary repair roughly 20 years ago to shore up the road over the discharge side of the drop inlet, which is still in place.

17. (Slide) More recently still, the Town hired CLA Engineers to perform a detailed hydraulic study of the watershed, w/ specific attention on the areas affected by this dam. It should be noted again that this dam is the control pt for the water level upstream thru the Rt12 culvert into a considerable area along Christy Hill Rd. The berm at the inlet of the pond was never intended to introduce another level of control.

18. (Slide) Here is a key summary/conclusion regarding the hydraulics in the watershed, particularly at the dam:

The culverts combined are classified as an Intermediate structure and should be capable of passing flow associated with the 100-year storm event (231 cfs). Analysis showed that overtopping of the Harvard Terrace is expected to occur during the 25-year storm event, which was determined to produce a peak flow of 159 cfs.

While the effect of the stone and earthen berm surrounding the concrete inlet structure was not analyzed, it is our belief that its presence restricts flow to this structure during heavier rain events, which ultimately negatively impacts the culverts combined hydraulic capacity. Nonetheless, the combined hydraulic capacity of both culverts is not sufficient to pass the 25-year storm event and therefore, it can be concluded that overtopping of Harvard Terrace will likely occur more frequently than current design standards recommend.

This will result in the dam and roadway being more frequently exposed to hydraulic forces that will cause erosion and damage like that experienced in recent years. This will ultimately increase the risk that the temporary measures installed to reinforce the dam will fail which could lead to more serious implications and possible dam failure. While dam failure may not result in significant damage or loss of life due to the dam's classification, it would result in the loss of direct access into and out of the neighborhood and the possible loss of potable water.

19. (Slide) Further, here is a depiction of the 100-yr FEMA Flood zones under baseline conditions, i.e., without any watershed obstructions. You can see how this mirrors the area of impact we would expect based on even recent experience w/ beaver activity.

20. (Slide) And thanks again to a local, longstanding resident of the neighborhood, here are photos of the flooding that occurred at the dam on Harvard Terrace in 2010. This dam happened to make out a lot better than many that either washed out completely or needed significant repair. And in correspondence that accompanied these photos, we were informed of a more serious flooding event in 1989. So, this is not just a hypothetical, and if we were to extrapolate fm the frequency of these events, we would see we're almost due again.

21. (Slide) And what would be the practical implications of dam failure? These 24 homes would be isolated fm ready access, which may be immediately required in such an event. And beyond this, there is public water supply piping across the dam that would be exposed & possibly severed due to dam failure.

22. (Slide) So, back to the task at hand. There are two areas where work is proposed: the inlet to the pond and outlet.

23. (Slide) Here is a photo taken at the inlet area after the trenches were cut thru the berm to relieve the flooding. This is the extensive beaver dam that needs to be removed. (Slide) We have determined for now that the best access path would be thru 39 Military Hwy then across the berm straddling 39 Military & 25 Harvard Ter fm W to E w/ a small track excavator. This would be adequate to clear & move the debris out of the stream bed onto the shoulder. Apart fm the logistics, this is pretty straightforward.

24. (Slide) At the outlet end we intend to work in this area to provide open connection between the pond & primary outlet control structure. You see that acc to the Town's GIS map this straddles the Town ROW into 25 Harvard Ter. (Slide) B/c some have questioned the accuracy of the Town's GIS map, I had the area professionally surveyed. (Slide) Zooming in, you see that the area of work is well w/i either Town ROW or 25 Harvard Ter.

25. (Slide) This is a better view of the area. We will be removing the illicitly placed structure you see here & excavating from there back toward the road. This would involve removing some small trees & leaving a space we would judge as adequate for free flow of surface water to the outlet structure.

26. We will also likely tend to anything we deem necessary at the two structures. And we will likely pursue much of this during the driest portion of the construction season, for obvious reasons.

27. But when we're done, we will not have addressed everything by way of state of repair that has gone into the fair to poor rating of the outlet conditions here. What we hope to accomplish at a minimum is providing the maximum amount of reserve storage capacity for the upstream watershed as possible to mitigate the risks associated w/ heavy storm events.